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Of the Cactus And Succulent Society Of America

Vol. III APRIL, 1932 No. 10

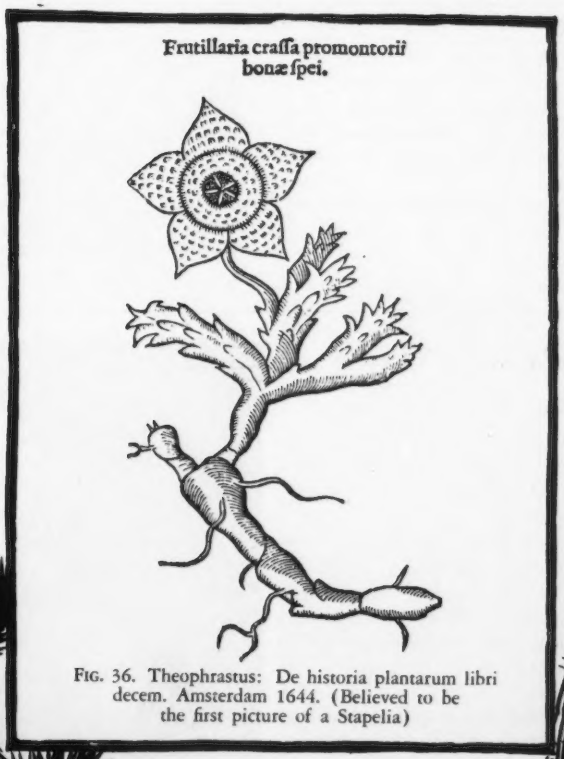

FIG. 36. Theophrastus: De historia plantarum libri decem. Amsterdam 1644. (Believed to be the first picture of a Stapelia)

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CACTUS AND SUCCULENT JOURNAL

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THE CACTUS AND SUCCULENT SOCIETY OF AMERICA

A monthly magazine to promote the Society and devoted to Cacti and Succulents for the dissemination of knowledge and the recording of hitherto unpublished data in order that the culture and study of these particular plants may attain the popularity which is justly theirs. "The Cactaceae," by N. L. Britton and J. N. Rose, has been adopted by this journal for purposes of identification. (Membership and subscription $3.00 per year, foreign $3.00 per year.) Mail membership application and subscription to the Secretary, Margaret Kincher, 1421 Dominion Avenue, Pasadena, California.

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Crassula columnaris Thunbg.

By ERIC WALTHER

In the history of local "Succulentology" still another achievement deserves to be recorded. This is the flowering, for the first time as far as we know in California, of *Crassula columnaris.* Truly, until the flowers do appear, it is easy to be skeptical about the reality of life in this extreme reduction of plant-body, almost unequalled in the *Crassulaceae.* Much rather might one take this to be some modernistic paperweight, or perhaps a stack of roofing-tiles in some brick-yard, than a mature, live plant.

The specimen shown in the appended photo was grown from Kirstenbosch seeds by our well-known member, Mrs. Davidson of San Francisco, amateur-winner of the Sweepstakes at last year's San Francisco Cactus-show.

It must be a matter of regret that the beautiful specimen is bound to end its life with this display of blossom, but the species is well-known to be strictly monocarpic, i. e., it dies after producing seed but once.

Crassula columnaris
Photo by Eric Walther., app., ¾ natural size

The Stapelieae

8. Stapelia (The *Orbea* Section)

By ALAIN WHITE *and* BOYD L. SLOANE

We have already explained that it is a convenience to divide the genus *Stapelia* into three groups, the *Orbea* section, the *Stapeltonia* section and the miscellaneous forms, even though such a division is not at all exact botanically.

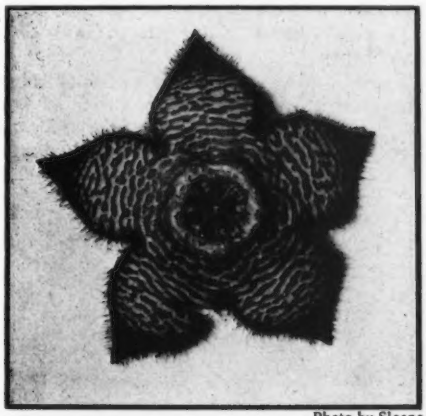

Photo by Sloane

FIG. 37. *Stapelia maculosa* x .75

The *Orbeas* are characterized primarily by a distinct raised ring at the base of the corolla, just around the central stigmatic crown, a ring somewhat like that in *Diplocyathus,* but much less extreme in height. This ring appears as a slightly raised cushion in *Stapelia maculosa* J. Donn, (the "spotted Stapelia"), a plant of unknown origin. Its ground color is a greenish yellow, thickly marked with transverse purple-brown spots or irregular lines. A similar thick annulus, but raised considerably higher, appears in *Stapelia mutabilis* Jacq., (the "changeable Stapelia"). This is a very odd Stapelia, shading from its light ochreous ring, through a series of well defined reddish brown spots and lines, to uniformly brown tips of the lobes. Like *S. maculosa* the lobes are noticeably fringed with hairs, those of *S. mutabilis* being very vibratile. The origin of the plant is also unknown, it having first been discovered in the Imperial Gardens in Vienna.

It may well be that both *S. maculosa* and *S. mutabilis* are simply hybrids of *Stapelia variegata* L. If that is the case, the difference in the annulus would indicate that one of the parents lay outside of the *Orbea* section. Indeed by carrying the process one step further the *Orbea* ring has been made to disappear altogether. This occurs in *Stapelia maculosoides* N. E. Br. (the "maculosa-like Stapelia"), which is generally considered to be a hybrid between *S. maculosa* and some member of the *Stapeltonia* section. The stems of *S. maculosoides* retain the usual *Orbea* form, and the flower is quite similar to that of *S. maculosa,* but no trace of the central ring or cushion remains.

The typical *Orbea* has the raised solid ring of *S. mutabilis* flattened or slightly recurved at the top in a sort of narrow parapet, which we know so well from the different forms of *S. variegata.* This is the *enfant terrible* of the Orbeas. It is true that other species exist. Berger lists fourteen in all, though it is hard to say how many of these are simply hybrid forms. Besides the species already mentioned we have in our collections the "angular Stapelia", *Stapelia angulata* Tod., probably just another hybrid form, noticeable for its very light yellow ring and dark lobes. We also have in this country many plants bearing the names of still other species, *S. bicolor, S. discolor, S. divergens,* etc., and as none of these are rare it may well prove that many of them are true to name, but those we have seen in flower have simply turned out to

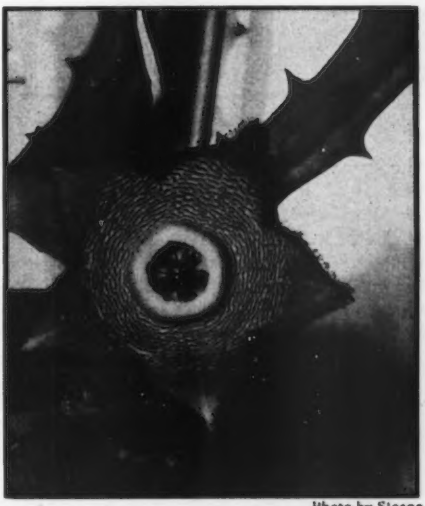

Photo by Sloane

FIG. 38. *Stapelia mutabilis* x .75

be good old Variegata in some of its numberless hybrid or varietal forms.

To try and straighten out all the Protean disguises of *S. variegata,* indeed, from the materials at hand in this country, would be a complete

Photo by Sloane

FIG. 39. *Stapelia maculosoides* x .75

waste of effort. We know from the Flora Capensis of N. E. Brown that some twenty basic varieties exist. Most of these appear to be native hybrid forms from the Cape, but they are not geographical varieties with distinct habitats. They overlap so that several may be found together in more than one locality. For example, Mr. Brown quotes N. S. Pillans as saying that he had "gathered seventeen different variations of *S. variegata* on Robben Island in an area of 80 by 100 yards. All these had distinct coronal and colour distinctions. Above Cape Town (on Table Mountain) there are quite as many, and on the Lion's Rump rather fewer".

But N. E. Brown's basic forms are the starting point for any study of *S. variegata,* and in our tabulated Key we have tried to present all the characteristics of these varieties in so far as they are mentioned by Mr. Brown. Unfortunately his descriptions are not always complete. He gives the salient points of each, and in some cases adds that the details not mentioned are as in the type, but in other cases he fails to say this. In the key we have taken nothing for granted: where a characteristic is not mentioned it is presumably as in the type, but verification of the fact has not been possible.

These basic varieties may be assumed to be stable. That is, they come true to type from seed; but we must even here remember that *S. variegata* hybridizes so easily that it is next to impossible to keep any check on the parentage of seed and N. E. Brown has pointed out that many hybrids are in cultivation under the name of their seed parent, although quite different from it. The more purely hybrid forms are mostly of unstable character, and further complications occur where they in turn are grown from seed by reason of their reversion to other earlier types.

Taken as a whole, *Stapelia variegata,* therefore, must be considered as in a state of flux, the parts of its flowers changing back and forth

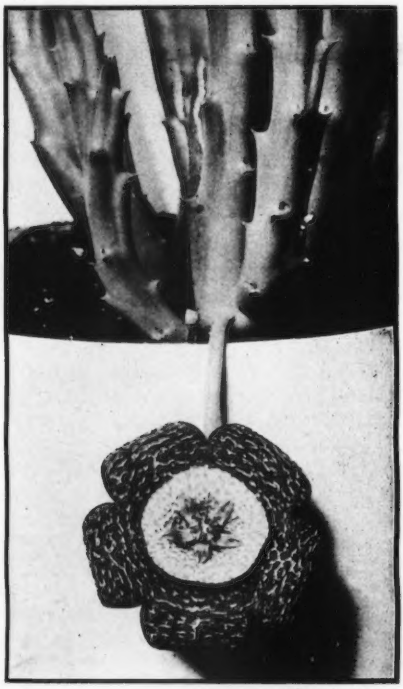

Photo by Sloane

FIG. 40. *Stapelia angulata* x .75

in an endless mutation. The hybrids of a given period, say the vintage of 1895 or that of 1910, may be studied and the forms available at such a moment may be tabulated and named; but ten or twenty years later a new crop will have matured, perpetuating some of the earlier characteristics and altering others. Old names will persist, but they will no longer have their original meanings.

(To be continued)

KEY TO VARIETIES OF STAPELIA VARIEGATA
Compiled from descriptions by N. E. Brown in Flora Capensis, 1909

	v variegata	a trisulca	b marginata	c pieniflora	d bufonia	e clypeata	f mixta	g horizontalis	h rugosa	i pallida	j curtisii	k retusa	l breviconnis	m conspurcata	n laeta	o picta	p marmorata	q atropurpurea	r atrata	s prometheus
BUDS: Acuminate										i										
Acute																				
Flat or round-topped																				
COROLLA: Rugose								g												
Size: Small, about 2″ or less														m		o	p			
Medium, between 2″ and 3″	v						f						l		n			q		
Large, 3″ or above							f											q	r	
Disk: Flat	v	a		c			f	g	h	i		k		m					r	
Basin-like					d								l							
ANNULUS: 5 grooved									h									q	r	
Shape: Pentagonal	v								h			k							r	s
Subpentagonal			b					g	h											
Variable					d		f			i			l	m				q		
Circular											j									
Recurved edge	v																			
Broad, flat edge							f	g	h											
Color: Paler than lobes	v		b				f	g	h		j					o				
Purple brown spots			b					g	h				l							
Blackish purple spots																		q		
Crimson brown spots															n					
Ground not yellow																	p	q	r	
Spots: Large spots												k	l		n	o			r	
Small spots	v		b				f	g			j									
LOBES: Ciliate														m					r	s
Not ciliate	v							g					l				p			
Variable						e	f													
Color: Not yellow																				
Pale greenish yellow	v					e	f	g	h	i	j		l			o				
Blackish purple spots																				
Crimson brown spots															n	o				
Purple brown spots	v		b				f	g	h	i	j		l						r	s
Bright lemon color										i	j				n					
Markings: margined			b																	
Small spots			b				f		h	i	j									
Large spots															n				r	
Irregular or in rows	v	a			d	e					j									
Series spots in margin								g												
Slender lines intermingled	v	a			d		f	g	h			k	l							
No slender lines			b																	
Variable regards lines				c		e				i										
Dark effect at base		a			d							k								
Central line on apical half								g												
Shape: Ovate	v																p	q		
Lanceolate																			r	
OUTER CORONA: Deeply bifid, 1-3 or more		a				e		g					l			o				
Shortly bifid, less than above			b	c	d					i		k		m			p		r	s
Minute tooth in notch		a																		s
Two toothed					d											o				
Three toothed	v								h		j									
Variable toothed						e	f			i		k		m	n					
Sides of teeth parallel	v			c	d		f	g		i			l	m			p	q	r	s
" " diverging			b																r	
Broad notched			b																	
Marks on teeth	v		b				f				j	k	l		n		p	q	r	
Marks on middle							f					k	l		n		p		r	
Spot at base			b				f					k	l		n					
INNER CORONA: Horns marked	v	a	b	c	d		f	g	h	i		k	l	m		o	p	q	r	
Horns of equal length							f											q		
Inner horn: Clavate						e		g				k								
Subulate																				
Connivent erect	v	a		c	d		f	g	h	i		k		m		o		q	r	
Diverging																				
Outer horn: Subulate																	p		r	
Clavate at apex						e		g				k								
Slightly or not clavate	v	a	b	c	d		f		h	i	j			m		o		q		
Ascending		a	b		d		f		h	i	j				n	o			r	
Ascending spreading												k		m				q		
Equal to or shorter than inner	v	a	b	c	d	e		a	i	j	k	l	m	n	o	p	q			
Longer than inner								g												

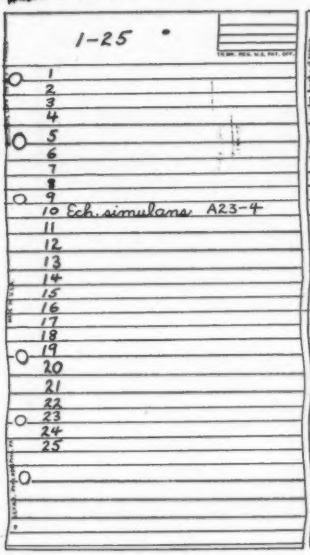

Fig. 1 (½ size)

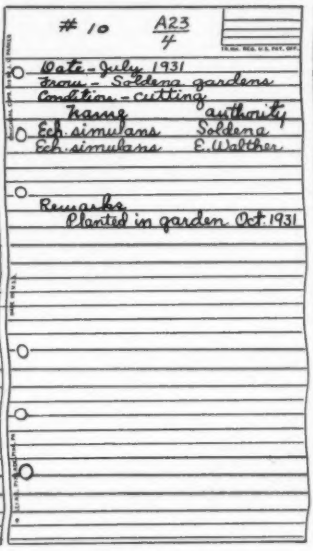

Fig. 2 (½ size)

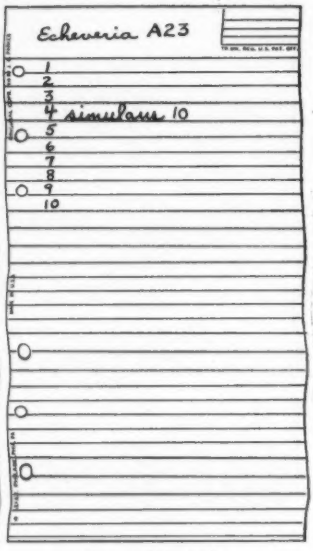

Fig. 3 (½ size)

Plant Records and Labels

By MINTON CRONKHITE

Being a novice with a desire to learn names and growing information about cactus and other succulent plants, without having to burden my memory with the details of every plant, a system was devised which may be of interest to others who are bothered by constant name-changing. The writer's collection consists of some 800 plants, many of which belong to the genera that are being revised at the present moment. These revisions are necessary as increasing knowledge and the discovery of new plants brings to light relationships that were not known before. It was with a semi-scientific desire to keep up with these changes that the system to be described was started, and, if kept up will help keep the names straight and may in time assist those who are endeavoring to study these interesting plants and place them in their proper relationships.

At present the general method of naming plants is to write the name on a wood label placed near the plant. This has many drawbacks. Labels of this kind get weatherworn and soon unreadable. Changes are made by scratching out the old name and rewriting, or a new label replaces the old. Instances have been known where a friendly change in a label has been made without the owner's knowledge. Dogs and cats and children often pull up labels rather than the more dangerous-looking plant. A collection in the greenhouse looks well with all the little wooden labels standing in a row, each set at the same angle leaning slightly back to be more easily read, but in the garden this has a tombstone effect, and the writer would rather not anticipate the plant's demise.

Upon receipt of a plant it is immediately given a serial number and recorded in a small pocket notebook, using a horizontal ruled sheet, such as Lefax sheet No. 9 (Fig. 1). The serial numbers are written in ink, 25 on each side of a page. The plant name is written in pencil opposite the number and, if unnamed, so marked. This plant is known, and any cutting or offshoot from it is known by this number, regardless of its name or the many names it may later be given. A sheet in the same loose-leaf book or a card is then made out bearing at the top this serial number, and on it is recorded the date received and whether a grown plant, offset, cutting or seeds (Fig. 2). Space is now left for names and they are recorded with the name of the person giving it, the first name, of course, being the one under which it was received, and the authority, the person from

whom it was received. When other visitors, looking at the plant, give it a name, record it, even though it may be the same. Again if checked by photograph or printed description by the owner, the owner becomes authority for that name. Ultimately, one will have a series of names, the proper one being apparent, giving due regard to the ability and knowledge of those who have been so kind as to give this plant its proper name.

A general record may then be kept on this sheet (Fig. 2), such as where the plant is kept, color of flower, time of flowering, seeds collected, cuttings made and particularly how the plant thrives under differing conditions of soil, water and sunlight. This record should be from actual observation of the plant itself, not the supposed details of a plant which this one is believed to be. This record is for identification of a particular plant, and though it may have been obtained as a specific plant, by careful recording of its growing habits, flowers and fruit, it may be found to disagree with what has been published, and it is thus that a new species is found or a more correct name for this plant may be located in already published documents.

Seeds collected from a plant do not carry the serial number of the mother plant, but each batch is given a new serial number. Seedlings of some genera are the bane of botanists' existence. If a proper record had been kept of the facts it would help tremendously; some hybrids are good, but too many is too much and we are bordering on the too many.

An auxiliary list is kept with a page for each genus in which one is particularly interested. At the head of the page is the name of the genus with a code number. In the example shown A stands for Crassulaceae, 23 for Echeveria and below are the specific names numbered in sequence (Fig. 3). If it is definitely determined that a specific plant is in the collection its serial number is placed after the specific name. This list is not essential, but it is a desirable addition, as one may refer to a genus, the list under it showing the named species in the genus and which of them are definitely represented in the collection. This code number may be put on the label below the serial number or on the back of the brass tag for more ease in finding the name but it is not essential and it may have to be changed.

The serial list (Fig. 1) and the auxiliary list (Fig. 3) are carried in the two sides of a Lefax double notebook and are all that is necessary when going about the garden or greenhouse. The individual record sheets (Fig. 2) or cards are kept in a metal file box in the potting house, or any place where it is reasonably handy.

On plants kept in the greenhouse the serial number is written on a wood label (Fig. 4), horizontally at the top, to keep it as far as possible from the dirt which is the first to destroy

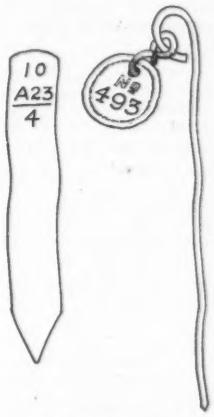

Fig. 4 (½ size)

the evidence. Remember that a flat or a whole section of a propagating bed may need only one label if the plants are cuttings or offsets from one single plant. Outside, the plants are numbered by using a brass key tag (Fig. 4) on which is stamped the serial number, using standard steel numbers hammered on the brass. The key tag is fastened by a brass ring to a 6 or 8 inch tinned meat skewer or piece of galvanized wire bent to a loop at the top, and stuck in the ground under the plant. The brass soon oxidizes down and lies flat on the ground. It cannot be seen by the casual observer but it can always be found and the number read when wanted.

All of this may seem to be a bit complicated at first, but if the system is started early and kept up it will make the collection of more interest, and with surprisingly little additional time it will build up a fund of information that will be of the greatest assistance to the scientific work being carried on by others. All plants or cuttings given or traded by the writer will have the serial number on the label whether named or not. Some day a plant or its child may return still numbered and the record will be there to show what it is.

EDITOR'S NOTE: Our ex-President Willis has a system that will interest readers, and we hope that Mrs. Wright will then give us the details of her system. Comments or questions on any of these systems will be appreciated.

A NEW BOOK

SUKKULENTEN. Ein Führer für Liebhaber und Sammler durch das Reich der Fettpflanzen—Von Dr. Wilhelm von Roeder—41 pp., 36 pl., many diagrams. *Franckh'sche Verlagshandlung,* Stuttgart, 1931. RM 5.80 (boards), RM 8.00 (cloth).

Extraordinary as it may sound, we have here the only book in print on the succulents other than cacti as a group, though it is needless to mention that nothing very exhaustive on so large a subject must be expected in 41 pages.

Dr. von Roeder is well and favorably known to many of us from his excellent series of booklets on cactus-culture published by the same firm in recent years. The present volume is written and illustrated in the same original and instructive manner. Even those innocent of German will find it amply worth the very modest price, for it is full of the author's inimitable diagrammatic drawings, which speak the universal language of pictures so eloquently, that a text seems almost superfluous. In addition there is a large number of very fine halftones from photographs picturing a great variety of species from many families ,a majority of them new, rare or seldom seen in this country.

Right at the beginning the frontispiece shows a succulent (or at least near-succulent) tree, from S. W. Africa, *Moringa ovalifolia* Dtr. & Berg., of the highly unfamiliar family *Moringaceae,* with a rugged, thin-foliaged crown growing from a pachydermatous-looking trunk. Other rarities include *Trichocaulon piliferum* and *keetmanshoopense, Stapelia ruschiana* and *tsomoensis;* three of the rarest and most beautiful Haworthias, *H. Bolusi, H. limifolia* and *H. viscosa, Adromischus cristatus; Euphorbia handiensis cristata* and *squarrosa; Crassula barbata, eendornensis* and *mesembrianthemopsis; Cotyledon cacalioides* and *reticulata; Greenovia aurea, Rosularia pallida* and *Sedum bellum* in flower; *Echeveria carunculata.* Other better-known things are there also, among them—and here the question, What is a succulent? becomes acute—no less than our old friend *Bergenia (Saxifraga) crassifolia* of the herbaceous border. However, the author explains this inclusion by the remark that such pseudo-succulent groups as saxifrages, bromeliads, yuccas and red-hot pokers are mentioned, as it were, *en passant.*

The text is divided into short but instructive paragraphs, beginning with culture, including soil and fertilization (on which subjects the author is a noted agricultural authority); the different families are then discussed in order, each with a list of species particularly recommended and cultural directions throughout emphasized by means of drawings.

Interesting to the many who have tried will be the statement that Aloes *will* root from leaves, providing that the entire stem-clasping base is removed with the leaf; worth a trial anyhow. We can hardly agree with the author's rather cavalier dismissal of the flowers of that genus as only moderately showy. We are sure that Dr. von Roeder would change his mind if he could see the Aloe Hill at the Huntington Gardens in full bloom. That the Aloes are comparatively unsuited for pot-culture in cold climates is demonstrated in the book by the picture of *A. mitriformis,* almost unrecognizable from etiolation to us that grow it under the California sun. A plea is made by the author against reckless and indiscriminate hybridizing of the *Aloineae ("das unseelige Bastardieren"!)* which apparently threatens to exterminate the good species in Europe. Some of us might take this to heart also, and not alone in this family.

The inclusion of *Ceropegia, Pachypodium* and *Cissus* under the heading *Portulacaceae* is a slip that should be remedied in future editions, as also some misspellings such as Diplocyatus and Kleinia fidoides and a number of errors in identification, for instance the plate captioned *Mes. albipunctum,* which evidently represents a *Nananthus* and not a *Rabiea, Echeveria pubescens* (?), which seems very dubious, and *Aeonium Lindleyi* which looks more like *Ae. domesticum variegatum.* Otherwise there is little fault to find with the nomenclature, which follows all the latest revisions.

A very useful tabulation of genera, indicating proper soil-mixture, flowering season and origin, concludes the textual part.

As a piece of book-making, the little volume is astonishingly good value for the money.

J. W.

Plant Labels

So many of our friends have been interested in our glass tube plant labels to the extent of using them in their own gardens, that we feel the idea worth passing along.

We use glass tubing 6-7 mm. in diameter, cut to any desired length. This tube is sealed at one end over a gas flame. The name of the plant is written with waterproof ink on fairly stiff paper, rolled up and pushed into the tube. The open end should then be closed with sealing wax or some other waterproof, easily removable substance. If the tube is sealed permanently at both ends it makes it difficult to change the label in case of necessity.

The advantage of this type of label is particularly great in the small garden because it is relatively inconspicuous, and remains legible.

WM. FULLER TAYLOR.

NEW PLANT AND SEED LISTS

R. GRAESSNER, Perleberg, Germany: 16 pg. seed list, cacti and succulents. (Free).

CURT BACKEBERG, Volksdorf, Germany: 2 pg. seed list, rare cacti and succulents. (Free).

MCCABE CACTUS GARDEN, Route 3, San Diego, Cal.: supplement to 25c General Catalog. List of cacti and succulent seedlings and seed list. (Free).

HERMAN TOBUSCH, 632 S. Wisconsin Ave., Villa Park, Illinois: 16 pg. illustrated catalog. Cacti and other succulent seeds. (Free).

REX D. PEARCE, Merchantville, N. J.: 48 pg. list of "Seed Rarities"—including cacti and succulents. (Free).

EDITOR'S NOTE: Price lists will be mentioned as received. When writing to these dealers kindly mention the JOURNAL. Books received by the Society will be reviewed by the staff and retained for the library of the Society.

BRITTON AND ROSE REPRINT

Vol. I., (8th Installment)

The following 8 pages are reprinted from "The Cactaceae" through the courtesy of Carnegie Institution of Washington, D. C. Volume I was published in 1919 and is now completely out of print. The demand for this rare volume is so great that the CACTUS JOURNAL is undertaking reprinting.

The Objects of My Travels and My Theory of Cactus Distribution

By CURT BACKEBERG
Translation by JAMES WEST

(Mr. Backeberg's article opens with a number of paragraphs alluding to his controversy with A. V. Fric regarding his (the author's) explorations in Colombia in 1928/29. Briefly, he refutes Mr. Fric's statements, published in the form of advertisements, tending to minimize the extent and value of the author's expeditions by saying that, at his own expense, he crossed Colombia from the Magdalena E. to the mountains and W. to the sea, with the result that he found ten new species and re-discovered *Pilocereus* (*Cephalocereus*) *albispinus*.
Mr. Backeberg's discoveries regarding globular cacti in Colombia are discussed in an article by Dr. Werdermann in Monatsschr. d. D. Kakteenges., January, 1932. Editor.)

I will formulate my theory more or less generally, in such a way as to make it interesting to the amateur, as a fantasy so to speak, which should stimulate him to study Berger's valuable "ENTWICKLUNGSLINIEN DER KAKTEEN."

In past ages one may suppose that there existed an ancestral cactus family, of the Pereskia relationship or thereabouts, with a greater tendency towards succulence than the latter, which itself persisted. Like the Pereskias, it occurred wherever conditions were tropical. Around this original stock there grew up highly succulent forms, my theory being that the centers of distribution were two river systems, judging from the density of occurrence of species as we know it today.

These were the Mexican system of the Colorado and the Rio Grande (where conditions were then more tropical), and the South American system of the River Plate. However, as I am going to point out, in between there must have existed another definite center of distribution, the existence of which I have always surmised; which precisely is the reason why I chose a territory from which no importing had previously been done: Northern South America.

Consider: Pilocerei and Melocacti occur (with extensions) in the West Indies, Colombia, Peru, Venezuela and Brazil; the distribution becomes denser in the West Indies (Southern part). How true Berger's statements regarding a coinciding distribution of Cephalocereus are, I had the pleasure of confirming later on in Peru. In contrast to Dr. Rose's findings I encountered *Pilocereus tweedianus* as far away as northern Peru, and on the very same spot a new Melocactus (*unguispinus*). Furthermore I discovered that the "Espostoa" from the Rimac valley in central Peru is not of that genus, but a true Cephalocereus, and again, right beside it, I found a Melocactus (*townsendianus*). Almost exactly the same parallelism occurs in Brazil in the case of the Discocacti. The way in which the genera are distributed as to density of occurrence allows of hardly any other deduction than that these genera must have in large measure belonged to a primary area of some extent in the now submerged part of the West Indies.

Berger's supposition, that the Melocacti represent a "cactoid" line of the Cephalocerei, thus gains great probability. (Melocactus flowers from the areole!) My findings in Peru show this almost to a dot, precisely in the extreme extensions of range. Now Berger, it is true, considers that Mexico cannot have been the cradle of the Cactaceae. But was there only a single one?

Formerly that area had a different appearance; the land bridge was situated to the East, along the Antilles. I thus suppose a three-way extension from the ancestral form, i. e. from the direction of the Gulf of Mexico (Colorado River system) and the Caribbean (West Indian region).

The way in which the occurrence of Cephalocereus and Melocactus is distributed shows that here in the West Indies there existed an older area, for the Mammillarias could not penetrate west of the Andes, while the cephalium-bearing species were able to reach Mexico. On the other hand, there must have existed a Mexican center of distribution, for the Mammillarias are but meagrely connected in the direction of the Antilles, while in the northern center the cacti are very rich in species.

Perhaps the case was like this: Stragglers from both centers intersected, later the connection was broken; Mexico, through favorable climatic changes, speeded up in its rate of evolution, while the subsidence of the West Indies

allowed only a slow extension of the forms remaining there.

Let us follow this up. The Antilles, considered as a mountain range, find their direct line of extension in the eastern chain of the Andes. Here it is that I found in 1930, for the first time in the interior, a second form of Mammillaria, which I considered to be a local variation of *M. simplex*. On the occasion of the publication of *M. hennisii* in January 1932[1] it was omitted to mention that I had made a prior announcement of this in the March, 1931, issue, p. 66 . . . *M. simplex* occurs likewise in Curacao, but not any farther. It is otherwise with the Cephalocerei and Melocacti, which, I am certain, had previously completed their advance into western Colombia and east to Brazil. The Mammillarias had just penetrated as far as Curacao when the land subsided. Curacao falls gently towards the mainland, but steeply towards the ocean. Therefore the Mexican lines of evolution did not reach the western Andine region. Hence my advertisement!

Distribution, density and outlying extensions of Mexican genera and species, as also, particularly and obviously, of West Indian ones, cause us to suppose two primary areas, the Mexican area lagging somewhat, and being only later on able fully to develop.

These considerations prevent me from believing in a migration of the Cactaceae from South America into Mexico. It is quite plain that the outlying members of two later evolutionary periods intersected one another in Northern South America, notwithstanding which ancient species occur everywhere. However, this fact just fits in with my theory.

But where was the South American cradle of the Cactaceae located? Apparently around the system of the River Plate, for here again we find a great density of species. How far, then, did this region extend, and where were the limits of distribution? To find the answer to this question was my reason for going to northern Peru. I began by studying Prof. Weberbauer's findings regarding globular cacti, entered them on my maps and went where a more difficult exploratory trip might seem compatible with the interests of my principal into the valley of Huancabamba, for there grow *C. lanatus* and other valuable species. Here is the greatest break in the Cordilleran range, so much so that it is actually planned to divert a tributary of the Marañon for the purpose of irrigating the coastal desert of the Pacific. There Prof. Weberbauer reported *Echinocactus aurantiacus* and *myriacanthus*. I could not, however, undertake the responsibility of any further exploration on account of the costs. So I turned back, but saw enough to know that no mass-migration had taken place into this territory, as I had previously supposed.

Now a globular cactus was discovered near Cati in southernmost Colombia. This is from northern Peru only half the distance between the latter and the southern boundary of Peru, not therefore very far. This species must somehow have broken into this territory; it and the Malacocarpus from Bogotá are the farthest outliers, which have here met with the relations of *Mam. simplex* (*M. bogotensis*).

My previous supposition, that that country is too poor in species to justify an expedition based on commercial considerations, was confirmed. Besides, both the last-named species belong to eastern, or more exactly southeastern, Colombia. But now, for instance, we find a Malacocarpus near Arequipa. What are the connections of fact in this case? On the eastern flanks of the Andes, between the tropical rain-forest and the high peaks, in a favorable, airy atmosphere, the globular forms have migrated north along a narrow strip. The east side of the Andes is the line of farthest extension from the direction of the River Plate system. Wherever an opportunity presented itself, they penetrated into the western valleys. If we could survey the intervening regions, unknown to us as yet, and too remote for travel, this fact might be even more fully confirmed.

In the gap of Huancabamba the aforementioned globular cacti appear. In the Peruvian valley of Rimac they occur from one end to the other (*Echinocactus peruvianus* and *Haynii*). And in the southern indentation, towards Arequipa, I found for the first time Lobivias, at the farthest point to which they could have advanced towards the West coast. Here again a Malacocarpus (*islayensis*) makes its appearance. Perhaps it also has descended this far, and the desert has prevented a further penetration northward. The eastern longitudinal valley likewise presents a globular form. Here also Lobivias have reached farther to the north.

An increase of genera and species southward shows from what direction the advance was made. Now we will have to determine whether there existed in ancient times a bridge of climatically favorable conditions leading to the arid region of Bahia, whether, on the other hand, it was a matter of penetration of stragglers, or finally whether we have before us merely an extension of the West Indian area. A map on which the theoretical distribution was entered in colors according to the known oc-

1(By Boedecker, in M. d. D. Kakt. Editor)

currence of genera and species would disclose much.

In this connection the genus Acanthocereus is of interest. It occurs in Colombia, Brazil and on the coast of the Gulf of Mexico. Being distinctly tropical, it must have originated on the lower-lying ground, now submerged, of the archipelago, and subsided along with the land, for so far it has not been reported from the West Indies. In so far its non-occurrence is not particularly remarkable (Berger, *Entwickl. d. Kakt.*, p. 43). But, exactly like the Melocacti, they have colonized both sides of the Andes, i. e. previous to the collapse.

In the same way, presumably, the riddle of *Cereus Smithii* (Venezuela) and *C. diffusus* (Peru) is to be interpreted. Each resembles the other very much, although the Cordillera lies between them. But as *diffusus* is located in line with the great Andean gap of Huancabamba, there exists the possibility of its having migrated hither from the East (Venezuela-Brazil).

From its uniform distribution alone, the genus Cephalocereus, a highly evolved, therefore presumably comparatively old one, may obviously be considered to come geographically from the West Indies. The fact that older types are lacking in Mexico may be explained by a delay in the occurrence of favorable geological changes there, while the areas of lowest elevation, which would have been the determining environment for the more ancient forms, were submerged, and left in general only forms from higher elevations. In South America, older types of cactus, such as Tephrocactus, found a suitable environment sooner, while in the North the chain of evolutionary forms found different conditions. Anyhow, my opinion is, that the Gulf of Mexico and the Caribbean represent a cactus-"cradle" of their own, the surviving remnants of which tell us so little only because the sea has extinguished everything. A glance at the map will suffice.

Is it at all worth while for the amateur to give thought to these matters? I think it is. We are always filled anew with inspiring thoughts when contemplating this very plasticity of the cacti, their marvellous adaptability and the wealth of forms which is a result of those qualities. How much more then ought we not to let ourselves be led into attempting to reveal the hidden secrets of their evolutionary history, and thus to discover ever greater marvels in our spiny friends. There is hardly another family of plants which reveals to us quite so fascinating a chapter of its family history, and of the wonderful processes of nature.

These few observations of mine should at least show that many an interesting problem in the field of cactus-evolution is yet open to study, and that it will be long indeed before the Cactaceae become tedious to us. A great deal of stimulation and new pleasure is yet to be won from our contact with these plants, for the cacti make things comparatively easy for us. It is not so very difficult to make a study of this evolution, one great help being the lucid work on the subject by Alwin Berger. My systematically executed explorations of the past few years were devoted to the gaining of added knowledge along the fundamental lines of his thought, which deserve a large degree of interest on the part of the amateur.

Photo by John Wright.

Bergerocactus emoryi flowering in Mrs. John Wright's garden in Santa Barbara, Feb. 2, 1932. Seldom seen in flower while in cultivation.

Recapitulation Theory

By Arthur D. Houghton

I present here a new line of research which promises to be of great value in the solution of problems relating to the evolution of Cacti. The study will also be a test of the Recapitulation Theory.

The Recapitulation Theory is one of the most valuable aids to the study of evolution.

The evolution of the Cacti is plain and understandable along main lines as far back as the *Pereskias* or *Quiabentia.* Beyond that occurs a profound break. Perhaps their nearest relative is to be found in some ancestor of the *Portulacaceae,* but this is only speculation and analogical reasoning.

The preliminary report presented herewith, of a study of baby spines, has been made for the purpose of enabling others to take up the work and see if the Theory of Recapitulation can aid us in tracing, not only generic interrelationships, but perhaps interfamilial relationships with botanically different families.

Scientists who study embryology, that is, the science of embryos (unborn babies in the animal kingdom and seedlings in the vegetable kingdom) discovered some years ago a remarkable fact: that is that the embryo in development from the first cell to the completed organism, exhibited a picture of the life of the race to which it belonged.

For instance, the human embryo begins as a single cell, indicating that its remotest ancestor was a one-celled organism which lived in a liquid in chemical composition, at least, quite similar to that of sea water.

At successively later stages of development the human embryo takes on the form of a Gastrea, or organized group of cells, formed into a bag of which the inner side performs the functions of a stomach; next the human embryo takes on the form of a fish, then of a reptile, and later, a rather close appearance to the quadrumana or monkey tribe, tail and all. It is only shortly before the birth of the human baby that the gill slits on each side of its neck close. After birth the baby still brings the soles of its feet together monkey fashion, and can hold its weight in the manner of its tree-climbing ancestor.

The embryo dog differs in its later stages from the human, but not so much in its earlier ones.

This theory of Recapitulation has proven so true on general lines as to be of value in researches affecting common ancestries.

A phylum is a main branch or stem of heredity descent. The phylum to which a Cactus belongs would branch off from the phylum to which man belongs way down near the one-celled ancestor; whereas the monkey phylum branches off near the top of the phylum to which man belongs. The history of an individual from his inception to his death is called his ontogeny, while his history from his present status back down his phylum to its earliest ascertained origin is his phylogeny.

Study of the embryo and its immediate post-embryonic morphology is what gives biology its clues to the phylogenetic history.

The facts presented in the list which follows were ascertained upon a study of six-months-old seedlings. The nascent or baby spines of the Cacti are very different from the mature spines; therefore they may give a clue to immediate ancestries. The observations were made with a 7X Hastings aplanatic triplet lens. In many instances hundreds of seedlings of each kind were observed.

Two important points occur to me: (1) shape and size of cotyledon will be taken into account later; and (2) I am planting Pereskia seeds of some species seeded in my own garden at San Fernando from type material of Drs. Britton and Rose. Pereskias, being the probable first members of the Cactus family, should throw much light on the history of the whole family.

The following list is too inadequate from which to draw general conclusions, but there are indications that purposeful research along these lines will prove fruitful.

Six-Months Old Seedlings Observed in Testing the Recapitulation Theory

Opuntia aoracantha—no hairs, no barbs visible on spines.
Cereus validus—dense, short, porrect hairs.
Cereus hildmannianus—no spine hairs.
Cereus jamacaru—no spine hairs.
Cephalocereus arrabidae—no spine hairs.
Cephalocereus euphorbioides—no spine hairs.
Cephalocereus trollii—no spine hairs.
Cephalocereus atroviridens—no spine hairs.
Cephalocereus lanuginosus—minute spine hairs.
Cephalocereus tetetzo—sparse, short, porrect spine hairs.
Genus unpublished: Species I—dense, long, porrect spine hairs.
Genus unpublished: Species II—no spine hairs.
(Probably will be published later as genus *Erythrocereus*)
Espostoa lanata—no spine hairs.
Browningia candelaris—porrect spine hairs.
Pachycereus columna-trajana—sparse, short, porrect spine hairs.
Pachycereus pecten-aboriginum—no spine hairs.
Lemaireocereus deficiens—sparse, porrect to retrorse spine hairs.
Wilcoxia striata—few, porrect to retrorse spine hairs.
Trichocereus pasacana—no spine hairs.
Trichocereus terscheckii—crowded porrect spine hairs.
Trichocereus fascicularis—dense porrect spine hairs.
Trichocereus schickendantzii—no spine hairs.
Trichocereus huascha—no spine hairs.
Jasminocereus galapagensis—dense porrect spine hairs.
Harrisia tortuosa—no spine hairs.
Borzicactus strausii—no spine hairs.
Borzicactus acanthurus—porrect spine hairs.
Binghamia melanostele—sparse porrect spine hairs.
Binghamia acracantha—dense, definitely ascending spine hairs.
Oreocereus irigoyeni—no spine hairs.
Neoraimondia macrostibas—very dense porrect spine hairs.
Hylocereus stenopterus—no spine hairs.
Selenicereus pteranthus—no spine hairs.
Echinopsis valida—crowded to ascending spine hairs.
Echinopsis staffenii—no spine hairs.
Echinopsis ducis-pauli—a trace of spine hairs.
Echinopsis (new Ritter)—no spine hairs.
Echinopsis leucantha—spine hairs densest of all, feathered.
Echinopsis wilkensii—no spine hairs.
Echinopsis formosa—sparse ascending spine hairs.
Echinopsis formosissima—sparse ascending spine hairs.
Echinopsis tubiflora—no spine hairs.
Echinopsis triumphans—no spine hairs.
Echinopsis campylacantha—sparse short ascending spine hairs.
Ariocarpus strobiliformia—dense, recurved, plumose, almost appressed spine hairs.
Matucana haynei—dense, porrect spine hairs.
Homalocephala texensis—no spine hairs.
Echinocactus grusonii—sparse porrect spine hairs.
Haagea schwartzii—very dense, long, ascending, feather-like spine hairs.
Malacocarpus ottonis var. *paraguayensis*—no spine hairs.
Aztekium ritteri—dense porrect spine hairs.
Cactus townsendii—dense porrect spine hairs.
Cactus neryi—very dense ascending spine hairs.
Cactus maxonii—slightly villose spines.
Cactus intortus—sparse long porrect spine hairs.
Cactus intortus var. *cristatus*—sparse long porrect spine hairs.
Coryphantha durangensis—no spine hairs.
Epiphyllum hybrids (numerous diverse)—no spine hairs.

The Veld with mesembs in flower.

On the African Veld

By MRS. D. VAN DER BIJL, *President, the South African Succulent Society*

To me there is no greater joy than to be out on the Veld, finding here an old friend and there a new one. Bulbs abound on the Karroo (our inland desert) as well as all over the coastal district. Thousands of them: some with fine flowers, others with very insignificant ones; some showing up only after very heavy rains, others springing into bloom after the merest shower.

The Karroo, with its dry climate and its rains so few and far between, always seems in such a hurry when it does rain. Seedlings are up in thirty-six hours, and I have seen bushes bloom and fruit in a fortnight, after a drought, when they have looked quite dead before a rain. But alas for many seedlings, how often they die again before flowering!

This last year has been a very good one on the Karoo, and at present the Veld is covered for miles with flowers of all sorts: fields of yellow or red Mesembryanthemums (mesembs vijgies) or white ones; miles of white daisies or red or yellow; thousands of smaller flowers; one tiny thing like a *Gypsophila* covers the ground and at night is so sweetly scented it even penetrates the houses. Many mesembs are night flowering, and those are usually the finest flowers, very sweetly scented.

Some of the mesembs have thick roots, which the natives clean and dry, and then pound up and that makes really very good yeast. They use it for making beer. To me it is always a puzzle how the natives discover the uses to which they put so many of the plants. Some are used as medicine. Another good yeast is made from *Anacampseros ustulata* and *A. papyracea,* but if one had to depend on it for bread there would be no bread. They are not only scarce, but very difficult to find, as they grow only between white quartz and hide most successfully.

Another of the mesembs, *Sceletium tortuosum,* is used for tanning skins and also as a smoke. I believe it contains a certain amount of opium. Of course most mesembs are excellent sheep food. "Vijgie vossie veld," fig-bush land, is

supposed to be very good, and one often hears after a rain: "The Veld is improving, the vijgie vossies are swelling.

It is usually supposed that succulents grow on the Karroo only, but the coast has a large variety of them and they are found quite near the sea, some of the mesembs growing right down to high-water mark.

Stapelias and many kinds of Euphorbias, as well as Haworthias and Gasterias and Aloes, are also found on the coast. Crassulas and Cotyledons abound.

The author and son in her rockery on the Karroo.

Crassulas on the Karroo are great drought resisters. I have visited a koppie during a severe drought, when even the bush had died, and the only things alive were two kinds of Crassulas growing on the rocks. The one, *C. barbata,* with its fine hairs closely drawn in, looked quite dead, but when opened up appeared alive and green and fresh. The other, an unnamed variety, very tiny, growing in large clumps, was in full bloom. The only moisture they could have got was from the rocks, the little condensation there must be at night, which Mr. N. E. Brown thinks accounts for the "rock-vijgies," Conophytums, having their roots so firmly wedged in the rocks, thereby keeping alive. I have seen their roots pressed flat like paper between the rocks, with no soil to speak of, and a wonderful clump sitting like moss on the rock.

Another remarkable fact about our succulents is the way they take on the colors of their surroundings. When one is found it is easy to find more, but often they escape the eyes even of the keenest collector. Recently I was told where a new Lithops was to be found, but it was only while taking out a bulb that I saw the first one, and then found a number. They were so much the color of the pebbles and so close to the ground, showing only little surfaces, that they were still difficult to find.

Most rare plants are very local. One finds a spot with perhaps hundreds of them, and then for miles around not another plant, and then again a colony of them. All this of course makes for the fascination of collecting.

Euphorbia ?

Mr. Leon Croizat, 127 W. 78th St., N. Y., sends this photograph of a Euphorbia from Holland. Do you know the name of this plant? If so, please communicate with Mr. Croizat who will describe it for the JOURNAL.

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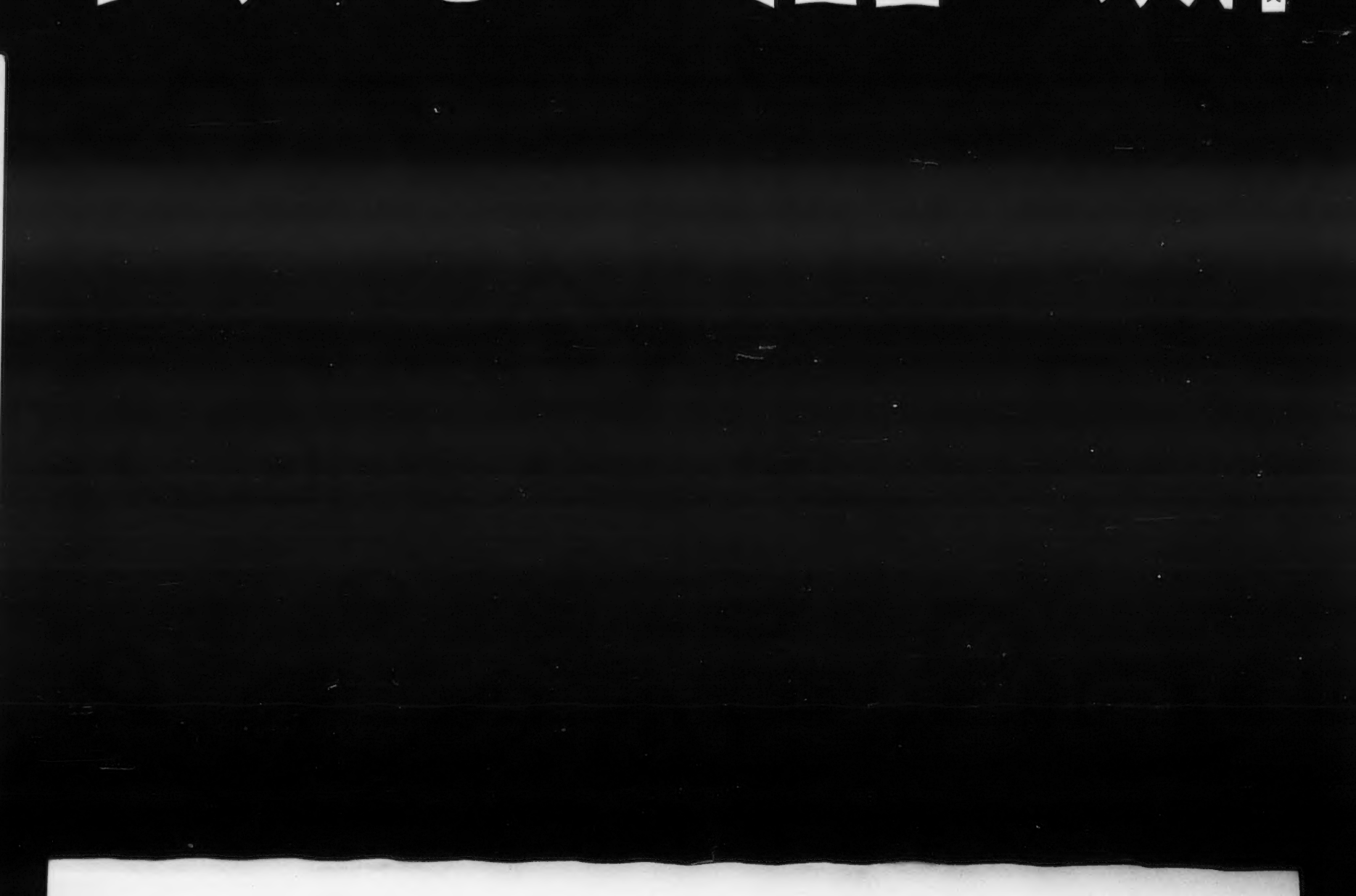
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